

CLAIMS

What is claimed is:

1. A process for obtaining frame synchronization and identifying a cell codegroup in a cellular communication system in which a plurality of synchronization codes organized in chips or letters transmitted at a beginning of respective slots is available, the process comprising:

acquiring, starting from said synchronization codes, energy values corresponding to respective individual letters with reference to possible starting positions of a corresponding frame within a respective slot; and

determining energies of corresponding words, storing just a maximum word-energy value and information for a corresponding starting position, said maximum word-energy value and said information regarding the position identifying, respectively, said cell codegroup and a frame synchronization.

2. The process according to claim 1 wherein said energy values corresponding to the respective individual letters are obtained by subjecting said synchronization codes to an operation selected from at least one of a correlation operation and a fast Hadamard transform operation.

3. The process according to claim 1 wherein said energies of the corresponding words are determined in a serial way at an end of acquisition of said values of energies corresponding to the respective individual letters.

4. The process according to claim 1, further comprising determining in parallel the energies of said corresponding words for said possible starting positions of the corresponding frame within the respective slot.

5. The process according to claim 1, further comprising:
providing a memory organized in registers, each of which contains energies of the individual letters of a code for all possible starting positions of the corresponding frame within the respective slot, said registers being connected as circular buffers; and
causing content of said circular-buffer registers to rotate by one position at a time for calculating successive word values corresponding to different possible starting positions of the corresponding frame within the respective slot.

6. A system to obtain frame synchronization and identifying a cell codegroup in a cellular communication system in which a plurality of synchronization codes organized in chips or letters transmitted at a beginning of respective slots, the system comprising:

an acquisition module to acquire, starting from said synchronization codes, energy values corresponding to respective individual letters with reference to possible starting positions of a corresponding frame within a respective slot; and

a processing assembly to determine energies of corresponding words, to store just a maximum word-energy value and information for a corresponding starting position, said maximum word-energy value and said information regarding the position identify, respectively, said cell codegroup and a frame synchronization.

7. The system according to claim 6 wherein said acquisition module includes at least one of a correlator module and a module which carries out an operation of fast Hadamard transform.

8. The system according to claim 6 wherein the processing assembly includes an accumulator module to determine said energies of the corresponding words in a serial way at an end of acquisition of said values of energies corresponding to the respective individual letters.

9. The system according to claim 6 wherein the processing assembly includes a plurality of processing modules set in parallel to determine in parallel the energies of said corresponding words for said possible starting positions of the corresponding frame within the respective slot.

10. The system according to claim 6, further comprising a memory organized in registers, each of which can contain energies of the individual letters of a code for all possible starting positions of the corresponding frame within the respective slot, said registers being connected as circular buffers, which are able to rotate by one position at a time content of said circular-buffer registers to calculate successive word values corresponding to different possible starting positions of the corresponding frame within the respective slot.

11. The system according to claim 6 wherein the acquisition module and processing assembly are included in a receiver for a telecommunication system based upon a standard from at least one of 3GPP FDD, UMTS, CDMA2000, IS95, and WBCDMA.

12. An apparatus, comprising:
a first unit to receive a plurality of synchronization codes organized in letters that are transmitted at a beginning of respective slots;
a second unit coupled to the first unit to acquire, starting from the received synchronization codes, energy values corresponding to respective individual letters; and
a third unit coupled to the second unit to determine energies of words corresponding to sums of the acquired energy values of the respective individual letters, and to store a maximum word energy value that identifies a cell codegroup and information for a corresponding starting position that identifies a frame offset.

13. The apparatus of claim 12 wherein the second unit comprises at least one of a bank of correlator modules and a bank of modules to perform fast Hadamard transforms.

14. The apparatus of claim 12 wherein the third unit includes an accumulator module to serially determine energies of the words subsequent to acquisition of the energy values corresponding to individual letters.

15. The apparatus of claim 12, further comprising a storage unit organized into registers, each of the registers able to contain energy values of individual letters of a code for all possible starting positions of a corresponding frame within a respective slot.

16. The apparatus of claim 15 wherein the registers are coupled as circular buffers that can rotate their content by one position at a time to calculate successive word values corresponding to different possible starting positions of a corresponding frame within the respective slot.

17. The apparatus of claim 12 wherein the third unit includes a plurality of parallel processing modules to determine in parallel energies of corresponding words for possible starting positions of a corresponding frame with a respective slot.

18. The apparatus of claim 12, further comprising:
a multiplexer coupled to the second unit to receive the acquired energy values of the letters;
an adder coupled to the multiplexer to calculate energy of a word from the acquired energy values of the letters; and

a maximum-detection module coupled to the adder to compare a received energy of a word from the adder with a previously received energy of a word, and to keep whichever of the energies of the word is greater.

19. A method, comprising:

receiving a plurality of synchronization codes organized in letters that are transmitted at a beginning of respective slots;

acquiring, starting from the received synchronization codes, energy values corresponding to respective individual letters; and

serially calculating an energy of a word based on the acquired energy values of the respective individual letters, and storing a maximum word energy value that identifies a cell codegroup and information for a corresponding starting position that identifies a frame offset.

20. The method of claim 19 wherein storing the maximum word energy value includes replacing a previously calculated word energy value with a new calculated word energy value if the new calculated word energy value is greater than the previously calculated word energy value.

21. The method of claim 19, further comprising parallel calculating a plurality of word energies for all possible frame offsets.

22. The method of claim 19, further comprising rotating contents of a buffer having the acquired energy values of individual letters one position at a time to calculate successive word values corresponding to different starting possible positions of a corresponding frame within a respective slot.

23. A system, comprising:

a means for receiving a plurality of synchronization codes organized in letters that are transmitted at a beginning of respective slots;

a means for acquiring, starting from the received synchronization codes, energy values corresponding to respective individual letters;

a means for calculating an energy of a word based on the acquired energy values of the respective individual letters, and for storing a maximum word energy value that identifies a cell codegroup and information for a corresponding starting position that identifies a frame offset.

24. The system of claim 23, further comprising a means for rotating contents of a buffer having the acquired energy values of individual letters one position at a time to calculate successive word values corresponding to different starting possible positions of a corresponding frame within a respective slot.

25. The system of claim 23, further comprising a means for parallel calculating a plurality of word energies for all possible frame offsets.